



(43) International Publication Date
14 April 2005 (14.04.2005)

PCT

(10) International Publication Number
WO 2005/033465 A3

(51) International Patent Classification⁷: G02B 6/00,
G01B 11/16, G01J 1/04

(21) International Application Number:
PCT/US2004/032114

(22) International Filing Date:
30 September 2004 (30.09.2004)

(25) Filing Language: English

(26) **Publication Language:** English

(30) Priority Data:
60/508,383 3 October 2003 (03.10.2003) US

(71) Applicant (for all designated States except US): SABEUS PHOTONICS, INC. [US/US]; 26679 West Agoura Road, Suite 100, Calabasas, California 91302 (US).

(72) Inventor; and

(75) **Inventor/Applicant (for US only): GOLDNER, Eric, L.**
[US/US]; 27521 Cunningham Drive, Valencia, CA 91354
(US).

(74) **Agents:** FITZGERALD, John, K. et al.; Fulwider Patton Lee & Utecht, LLP, Howard Hughes Center, 6060 Center Drive, Tenth Floor, Los Angeles, CA 90045 (US).

(81) **Designated States** (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM,

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,
ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declaration under Rule 4.17:

- *of inventorship (Rule 4.17(iv)) for US only*

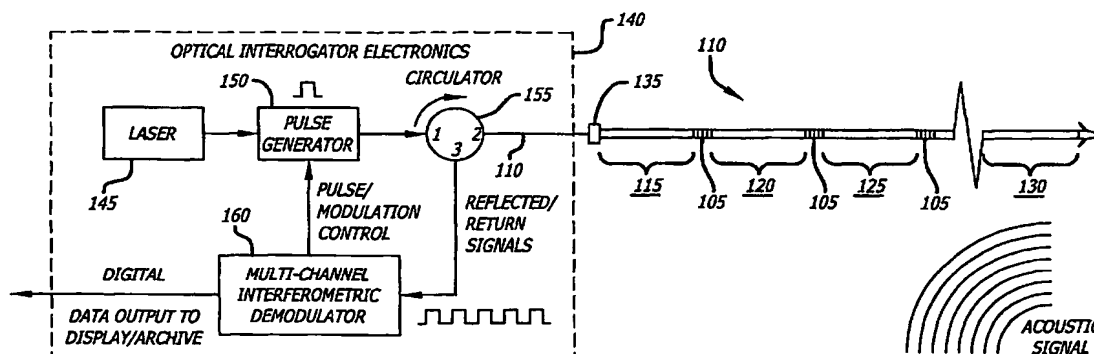
Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:
29 September 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: DOWNHOLE FIBER OPTIC ACOUSTIC SAND DETECTOR



(57) Abstract: An array of fiber optic acoustic sensors (115, 120, 125, 130) is formed within an optical fiber (110). The array of acoustic sensors (115, 120, 125, 130) may be deployed to a well bore (55), such as acoustic signals resulting from sand invading the well bore (55). A plurality of acoustic sensors may be formed by forming a plurality of periodic refractive index perturbations at selected intervals within the acoustic sensing section (115) of the optical fiber (110). The optical fiber (110) may be deployed within the well head within a suitable protective arrangement such as deployed through a tube or armor (35) using a suitable arrangement such the optical fiber (15) is protected, yet retains sensitivity to acoustic signals. The fiber optic acoustic sensor of the present invention may be unobtrusively mounted on the exterior of a well casing such that the sensor is not in the fluid stream.

WO 2005/033465 A3